

# Radio

**SHORT WAVE LISTENING**

**Reprinted  
from  
Boys' Life**

**Price 15 cents**



# Listen-in on the World



**F**ROM THE LOUD speaker of the radio comes the strange cackling sound of the "Laughing Jackass." It is the call of the Kookaburra, a native bird of Australia. The announcer says "This is Radio Australia, calling the United States and Canada."

For a receiver, any type capable of tuning to the short wave bands will do, such as an all wave broadcast receiver, a home-built short wave set, or a low priced communications type receiver. Take a look at the family radio in the living room. It may include short wave bands. If not, perhaps there is an amateur radio operator in your neighborhood who will help you build a simple short wave receiver.

tions is desirable. However, if erection of such an aerial presents difficulties, try dropping one end of a piece of insulated wire out the nearest window and attaching the other end to the antenna terminal of your receiver.

You will note that the short wave portions of the dial of your receiver are marked off in megacycles. Radio transmitters operate in the various parts of these megacycle bands. These transmitters include land communications stations, maritime stations, aeronautical stations, amateur stations, and broadcasting stations. Of these, the broadcasting and amateur stations are of the most interest to short wave listeners. Each type of station is assigned certain bands for operation, by international agreement.

5.95 to 6.20 mcs.  
7.10 to 7.30 mcs.  
9.50 to 9.80 mcs.  
11.70 to 12.00 mcs.  
15.10 to 15.45 mcs.  
17.70 to 17.90 mcs.  
21.45 to 21.75 mcs.

The broadcasts of these stations are intended for a number of different purposes. Some are for domestic coverage of the country where the transmitter is located. This type of station is particularly common in tropical areas of Central and South America, Africa, and Asia. Some countries, such as Portugal, broadcast in their own language to former residents now living in foreign countries. Norway broadcasts to its seamen on ships in various parts of the world.

Reception conditions on each of the short wave broadcast bands vary considerably at different times of the day, and also at different seasons of the year. Learning when to listen on each band is very important in hearing foreign stations.

During the winter months, the best bands for evening reception are lower

The foreign stations which are heard best in the United States are the high powered stations which broadcast special programs intended for this area, using directional antennas beamed toward North America. Following are some of the stations broadcasting programs in English for North America which are heard well:

*Australia*—"Radio Australia" transmits to Eastern North America daily on 11.81 megacycles, opening its broadcast at 7 A.M., E.S.T., with news from Australia, followed by musical and feature programs, including talks on life in Australia. There are broadcasts for Western North America at 7:00 A.M., P. S. T. on 11.81 mcs. and at 8:30 P.M., P.S.T., on 15.20 mcs. This is one of the most distant stations that can be heard in the United States.

*Asia*—“Radio Ankara,” Turkey, is the best heard Asiatic station in the eastern part of the U. S. Ankara transmits at 6:15 to 7:00 P.M., E.S.T., on 9.515 mcs., opening with typical Turkish music, followed by news of events in Turkey. This broadcast can also be heard in the western states, but the signal strength is less.

Western listeners will find good Asiatic reception from Radio Tokyo, at 9 to 10 P.M., P.S.T., on 9.675 mcs. and also on 6.07 or 11.705 mcs.

**Africa**—Leopoldville, Belgian Congo. provides our best reception from Africa. It can be heard during the evening hours on 9.77 mcs., with programs in French, Spanish and Portuguese. Their program in English opens at 10 P.M., E.S.T. (7 P.M., P.S.T.).

*Europe*—You can hear real Swiss yodel music from "Radio Switzerland." Their program for North America opens at 8:30 P.M., E.S.T., on 6.165 mcs., 7.21 mcs. and 9.535 mcs., and is repeated for Western North America at 7:15 P.M., P.S.T., on the same frequencies. Their programs of typical Swiss music are especially enjoyable.

**South America**—"Brazil Calling" is an interesting program from South America, transmitted from Recife at 8:05-8:30 P.M., E.S.T., daily except Sunday, on 9.565 mcs. The program includes lively Brazilian rumba music, and talks in English about Brazil.

The preceding are just some of the broadcasts in English from foreign countries which can be heard. A more complete listing of broadcasts beamed to North America is shown in the accompanying tabulation.



## AMATEUR STATIONS

Amateur stations also provide interesting listening on the short wave bands. These are stations operated, by private individuals, and sometimes by club groups, for the purpose of radio construction and experimentation, and communication with other amateur stations.

The principal bands for amateur station operation are as follows:

1.80 to 2.00 mcs.  
3.50 to 4.00 mcs.  
7.00 to 7.30 mcs.  
14.00 to 14.35 mcs.  
21.00 to 21.45 mcs.  
28.00 to 29.70 mcs.

The reception characteristics of these bands vary considerably.

The 160 meter band (1.80 to 2.00 mcs.) is generally useful only for relatively short distance transmission, up to a few hundred miles. Best reception is at night.

The 80 meter band (3.50 to 4.00 mcs.) is useful for short distance transmission during the day and medium distance transmission, up to 1000 miles or more, at night. Phone (voice) stations in the U. S. are assigned 3.80-4.30 mcs., the remainder of the band being for CW (Morse code) operation. Many interesting contacts among U. S. amateurs can be heard in this band.

The 40 meter band (7.00 to 7.30 mcs.) is assigned only for CW operation in the U. S. Some foreign amateur stations, mostly on CW operation, can be heard in this band during the night hours. The upper part of the band is shared by broadcast stations outside of the American area. The combination of U. S. amateur and foreign broadcast operation makes reception of foreign amateurs difficult in this band.

The 20 meter band (14.00 to 14.35 mcs.) is the best band for foreign amateur reception. U. S. phone stations are assigned the section 14.20 to 14.30 mcs. Most foreign phone operations are in the sections 14.10 to 14.20 mcs. and 14.30 to 14.35 mcs., on either side of the American phone band. Most CW operation is in the low end of the band, between 14.00 and 14.10 mcs.

The foreign amateur stations which can be heard in this band vary considerably with different hours of the day and different seasons. During the fall and spring months, the band opens up at about daybreak, with European and Latin American stations predominating. Australian and Asiatic stations will be heard occasionally in the Eastern states and frequently in the Western states. Most of the stations fade out by about 9 A.M. E.S.T. The trans-

Pacific stations are heard later in the western section of the country. During the afternoon hours, reception is best from Europe and Africa. In the evening, Latin American stations are heard.

In the winter months, the European stations usually fade out after early afternoon, but this provides a good opportunity for hearing African stations without interference from the more numerous Europeans. After a period of Latin American reception in the late afternoon and early evening, the band will usually be "dead" until the next morning during the winter months, except for local U. S. stations.

In the summer months, the Europeans and Africans can be heard during the afternoon hours and into the early evening period. The evening hours are good for reception from Central and South America.

It will be noted that the stations of each country are designated by the prefix of their call letters. U. S. stations use W or K prefixes. The most frequently heard foreign countries from Europe are England (G), France (F), Germany (DL) and Italy (I); from Africa—Morocco (CN8) and South Africa (ZS); from the Pacific—Australia (VK), Japan (J), and Guam (KG6).

Reception of these relatively low powered stations varies greatly from day to day, so don't be discouraged if you don't hear much the first few tries. One good way to determine how reception conditions are is to note what stations the U. S. amateurs are calling.

The 15 meter band (21.00 to 21.45 mcs.) was first opened to amateur operation in May of this year. The original assignment was for CW operation only, but it is expected that opening of a part of the band to phone operation will have taken place by the time this is read. The Federal Communications Commission has proposed 21.00 to 21.10 mcs. and 21.35 to 21.45 mcs. for U. S. phone operation, leaving the space between for foreign phones and U. S. and foreign CW stations. This is primarily a daylight band. During the fall, winter and spring months, reception should be good from Europe and Africa during the morning and early afternoon. Latin Americans should be audible throughout the day, and Australians and perhaps a few Asiatics in the late afternoon and early evening.

The 10 meter band (28.00 to 29.70 mcs.) is very good when it is good, which it was during the 1947-1950 period of high sunspot activity, but in the present period of decreasing sunspot activity, conditions for distant transmission on this band are declining. This, like the 15 meter band, is



a daylight band. The best reception during the coming fall, winter, and spring months should be from Latin America during the morning and afternoon. There should be occasional reception from Africa in the late morning and early afternoon, and from Australia and New Zealand in the early evening. Reception from Europe on the 10 meter band is unlikely at present.

Reviewing the amateur bands, it will be seen that the 20 meter band is much the best for foreign reception, but that the 15 meter band offers good opportunity for future development, depending particularly on how many countries authorize amateur phone operation on this new band.

## RECEPTION REPORTS AND VERIFICATION CARDS

One of the most interesting parts of the hobby of DX (distant) reception is sending reception reports to stations heard and obtaining verification cards ("QSL" cards) from them confirming your reception of these stations. The many interesting and colorful verification cards that are sent by short wave stations make a fine collection for displaying on a wall or in albums. Obtaining them also provides an excellent means of obtaining new foreign stamps for your stamp collection.

Reports to stations should include the frequency, date and time of reception. It is preferable to list times in 24 hour Greenwich Mean Time, which is equal to Eastern Standard Time plus five hours (7 a.m., E.S.T. is 1200 G.M.T., 8 a.m. E.S.T. is 1300 G.M.T., etc.).

Reports to broadcast stations should include details of the programs heard, including language, type (news, music, etc.), and name of program. Reports to amateur stations should include the call letters of stations with which contacts were made and the time of each contact.

Reports to all stations should include information on signal strength, intelligibility, interference and fading. The following reporting system is generally used: Intelligibility or readability: R1—unreadable, R2—poor, R3—fair, R4—good, R5—excellent; Signal Strength: S1—barely audible, S2—very weak, S3—weak, S4—fair, S5—fairly good, S6—good, S7—moderately strong, S8—strong, S9—very strong. A report on comparison with other stations in the same area is usually appreciated.

Many broadcasting stations announce their mailing address over the air. Listings of short wave broadcast station addresses, as well as frequencies, schedules, etc., are included in the "World Radio Handbook," an annual publication printed in Denmark, which can be purchased from its United States representative at 1000 Connecticut Ave., Washington, D. C. Amateur station addresses are listed in the "Radio Amateur Call Book," which is on sale in amateur radio stores.

Many government operated broadcasting stations, including most of the European stations, will verify without return postage being sent to them.

For other stations, return postage should be sent. This may be in the form of an International Reply Coupon, which may be purchased at any post-office for 11¢, and is exchangeable in most countries for stamps for return postage to the U. S. For amateur stations in the U. S., in U. S. Territories, or at APO or FPO addresses, an addressed return envelope with a six-cent airmail or three-cent regular mail stamp attached will make it easier for the station operator to send a verification card.

Don't expect all the stations to reply, but comprehensive reports and return postage are valuable aids in obtaining a good percentage of replies to reports.

## DAILY VARIATION IN RECEPTION CONDITIONS

The expected reception referred to in the preceding is that expected under normal conditions. The factors affecting long distance radio transmission vary from day to day. On some days reception will be very good, but at times, generally for periods of several consecutive days, transmission conditions will be "disturbed" and only the more powerful stations can be heard. But normal conditions will return after the disturbance has ended, and reception will again be good.

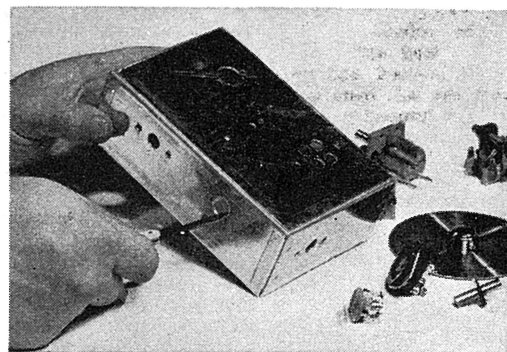
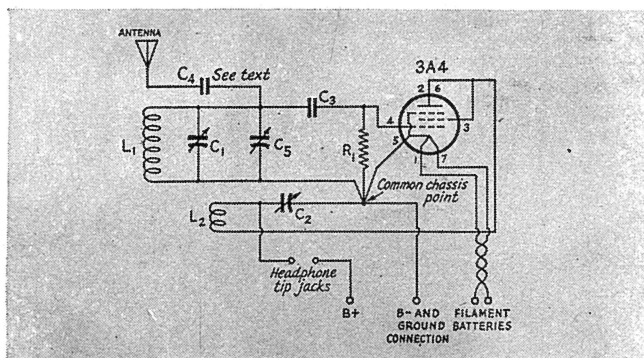
As one gains experience in knowing where and when to listen for DX stations, more and more countries on all continents can be heard. Your short wave receiver can provide an inexhaustible source of interesting reception from all parts of the world.

THE END

## BROADCASTS IN ENGLISH TO NORTH AMERICA

From	Time—E.S.T.*	Frequency
Ankara, Turkey	6:15-7:00 P.M.	9.515 mcs.
Athens, Greece	8:00-9:00 P.M.	7.300 mcs.
Bern, Switzerland	8:30-11:00 P.M.	6.165, 7.21 9.535 mcs.
Brazzaville, French Equatorial Africa	4:00-6:00 P.M.	9.440, 11.970 mcs.
Buenos Aires, Argentina	5:30-8:30 P.M.	17.720 mcs.
Copenhagen, Denmark	9:10-9:30 P.M.	9.520 mcs.
Guatemala City, Guatemala	10:00-10:30 P.M.	9.670 & 11.850 mcs.
Leopoldville, Belgian Congo	10 P.M.-12:15 A.M.	9.770 mcs.
London, England	10:00 A.M.-12:15 P.M.	17.810 mcs.
	4:00 P.M.-10:00 P.M.	6.195 & 9.825 mcs.
	6:00 P.M.-6:40 P.M.	9.360 mcs.
	10:15 P.M.-10:55 P.M.	9.360 mcs.
Madrid, Spain	7:00 A.M.-11:15 A.M.	11.810 mcs.
	8:05 P.M.-8:30 P.M.	9.565 mcs.
	(except Sunday)	
Rome, Italy	7:00 P.M.-8:00 P.M.	9.575 & 11.905 mcs.
Stockholm, Sweden	7:00 A.M.-7:15 A.M.	15.155 mcs.
Tokyo, Japan	12 Mdt.-1:00 A.M.	9.675 & 6.07 or 11.705 mcs.

\*—subtract 1 hour for C.S.T., 2 hours for M.S.T., 3 hours for P.S.T.



ABOVE: "Schematic diagram" of the one-tube receiver. Check this constantly. RIGHT: Use parts as guides for place and size of

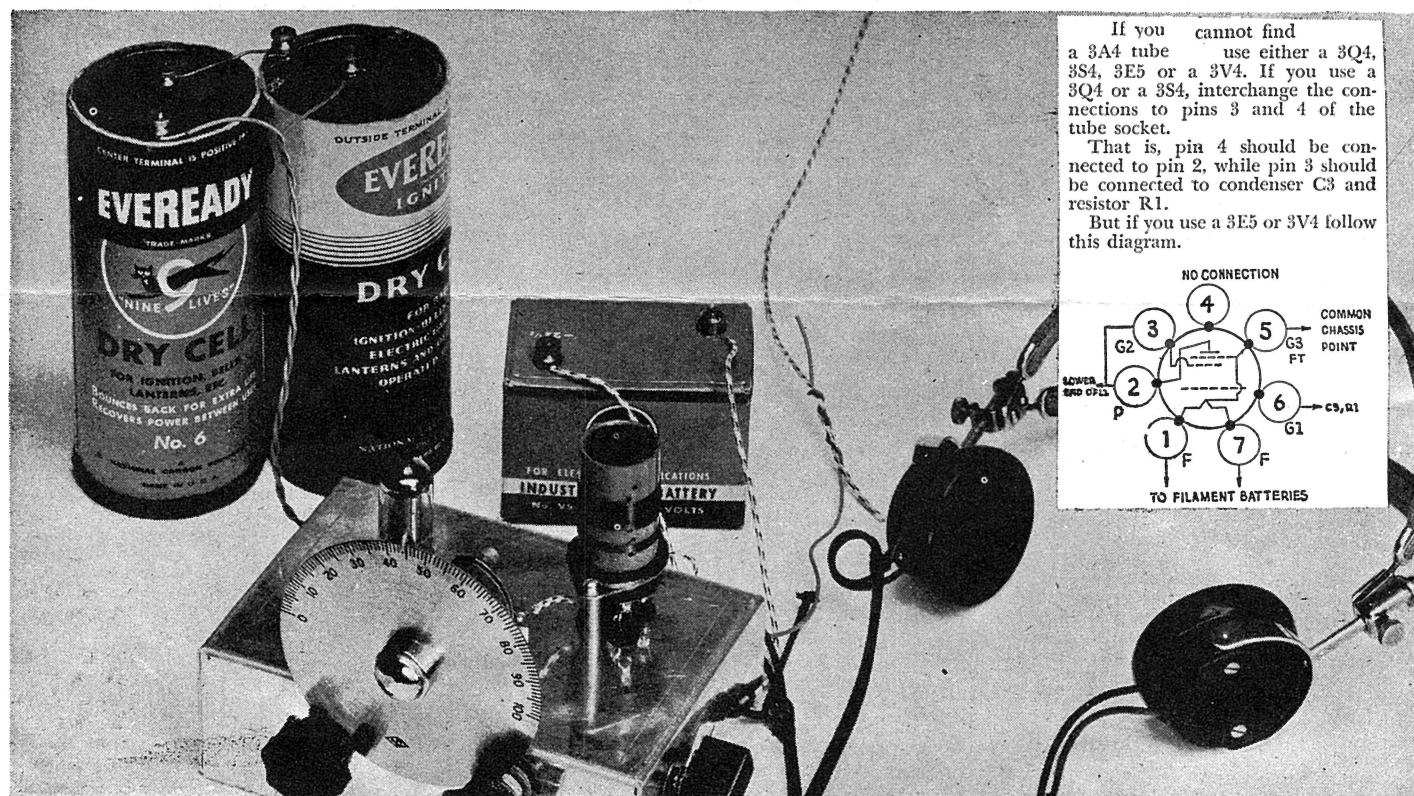
holes in chassis. After drilling, smooth off burr with knife. Parts needn't be placed *exactly* as shown; follow closely as possible.

# One-Tube Receiver

**You won't need a license to pick up ARRL's regular code practice broadcasts on this receiver the League designed for *BOYS' LIFE***

The simple one-tube receiver below will pick up amateur signals, ships at sea, aircraft, commercial press stations, and practically any other short-wave broadcast. All the parts, including the

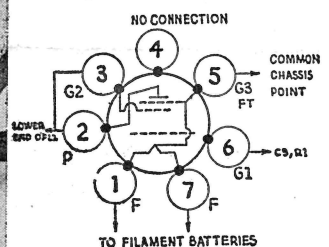
aluminum chassis, may be bought at most radio supply houses. The set, designed by the American Radio Relay League, for beginners, can be built at a cost of about fifteen to twenty dollars.



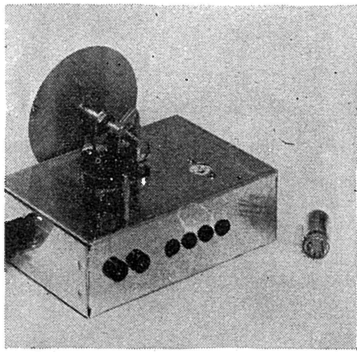
If you cannot find a 3A4 tube use either a 3Q4, 3S4, 3E5 or a 3V4. If you use a 3Q4 or a 3S4, interchange the connections to pins 3 and 4 of the tube socket.

That is, pin 4 should be connected to pin 2, while pin 3 should be connected to condenser C3 and resistor R1.

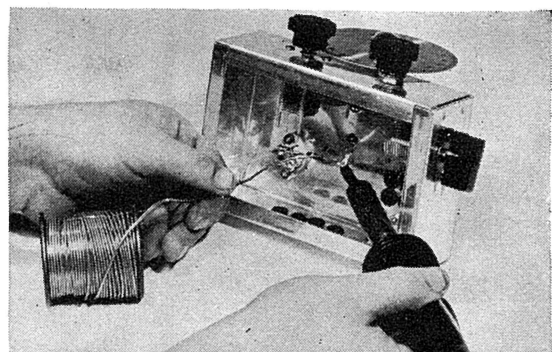
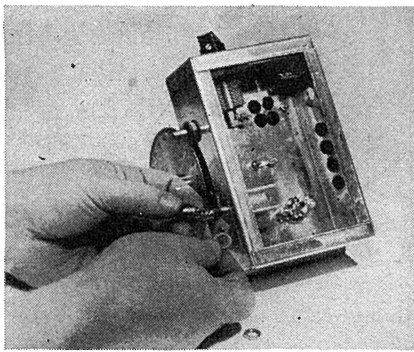
But if you use a 3E5 or 3V4 follow this diagram.







**LEFT:** Rear view of chassis shows parts on top and rear. Rubber grommets prevent wires touching chassis. Mount coil socket with large holes toward front. **CENTER:** Washer for headphone jacks goes inside chassis, lip extends through hole to rear, prevents chassis touching metal of jack.



**RIGHT:** Always hold soldering iron on part until part is hot enough to melt solder. Don't apply solder direct to iron. Here, resistor R1 is connected between pin 4 and ground lug.

**WE PRICED THE** parts for this one-tube receiver in New York City, and they came to \$17.05. That's starting with nothing, and buying all parts in a high-price area. By shopping wisely, you should be able to get them for about \$15, maybe less. Of course, you can get fancy on some parts and run your cost up, but even at that, as long as you stay on the beginner's level with us, you can't possibly get rid of more than \$20.

If you know your radio pretty well, or have a friend who does, you can pare down the parts cost. For one thing, if you know a ham, he undoubtedly has a "junk box," from which he may be able to pull out some of the items you need. By knowing where to shop—surplus stores, or "radio row" in the big city—you can pick up others at less than catalog prices.

For your money and time you will have a working receiver capable of picking up amateur signals, ships at sea, aircraft, and the code-practice broadcasts of the American Radio Relay League. The League broadcasts at 9:30 P.M., Monday through Friday, at Eastern Standard Time. If you're after that Novice Class ticket, you'll find the ARRL broadcasts tops for real practice.

Before you start to build your receiver, let's take a look at the big photograph of the finished job at the left. That may help you when you go out to buy your parts.

The chassis is aluminum, and we've been assured the supply is plentiful. If not available in your town, perhaps you can find a steel chassis, though it will be harder to work. You can also use a cigar box and save money on both the chassis and the grommets; however, you won't have a sturdy set.

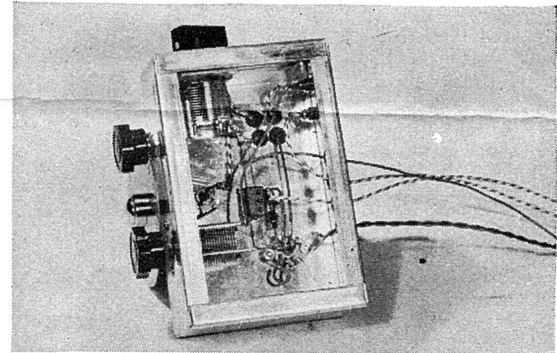
The two No. 6 dry cells are for the tube filaments. The other battery provides plate voltage (B plus).

The two wires twisted together between the plate battery and the headphones are shown in Figure I as C<sub>4</sub>; they connect the antenna to the receiver. There is no direct electrical connection; the two pieces of insulated wire are simply twisted together.

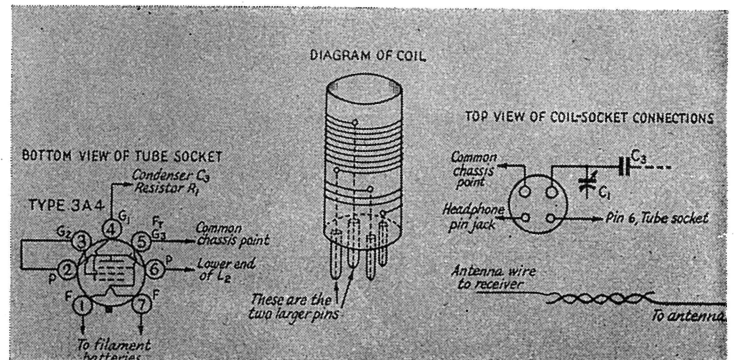
Knob C<sub>2</sub>, at the left, is called the "regeneration control," and functions much easier than its name implies, as we will discover when we turn on the set. Knob C<sub>1</sub>, front, right, is the tuning condenser knob. You bend a piece of wire around the shaft bushing, loop it over the dial, and you have a tuning guide. The knob on the right of the chassis control C<sub>5</sub>, the bandset condenser.

## Parts You Will Need

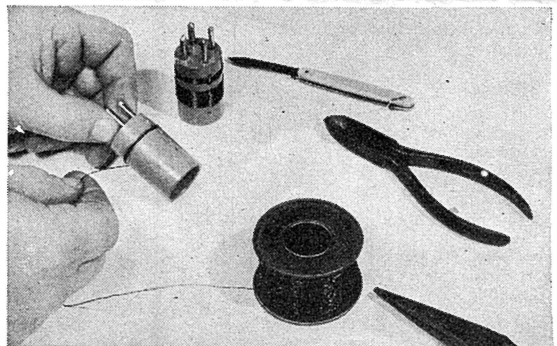
- |                                                            |                                                              |
|------------------------------------------------------------|--------------------------------------------------------------|
| C <sub>1</sub> —25 mmfd variable condenser (Millen 19025)  | 1 National type K dial                                       |
| C <sub>2</sub> —100 mmfd variable condenser (Millen 20100) | 2 knobs                                                      |
| C <sub>3</sub> —mica condenser, 100 mmfd                   | 2 headphone tip jacks                                        |
| C <sub>4</sub> —two short strands insulated wire           | 8 1/4" grommets                                              |
| C <sub>5</sub> —100 mmfd variable condenser (Millen 20100) | 2 metal spacing sleeves to elevate coil socket above chassis |
| R <sub>1</sub> —6.8 megohm resistor, 1/2 watt              | Miscellaneous nuts and bolts                                 |
| 1 aluminum (or steel) chassis, 4" x 6" x 2"                | Hook-up wire (bell wire may be used)                         |
| 2 coil forms, 1" diameter                                  | 1/4 lb. #26 magnet wire (for winding coils)                  |
| 1 miniature tube socket                                    | 1 type 3A4 tube                                              |
| 1 4-prong bakelite coil socket                             | 2 No. 6 dry cells                                            |
|                                                            | 1 22 1/2 volt battery (portable radio type)                  |
|                                                            | 1 pair headphones, 2000 ohm                                  |



Finished underside looks like this. Twisted wires go to filament batteries. Wire above goes to minus post on B battery. Top wire twisted to antenna lead-in forms C-4. Ground connection may be made to minus side of B battery.



Schematic diagram of tube socket connections, coil winding layout, and coil socket connections. They've got to be right.



Coil may be wound either right-handed or left-handed, but L1 and L2 must be wound in same direction. Wind Coil A, L1 22 turns and L2 7 turns, with 1/4" between windings. Wind Coil B, L1 nine turns, and L2 four turns with 3/8" between.

# SWLing is Swell

## Qualifying In Code

Once you figure on stepping from SWLing to transmitting, you must earn your "ticket." For that license, you will need to know your code. Listen, then, to c.w. practice from WIAW, headquarters station of the American Radio Relay League. WIAW transmits an hour of code practice every night, simultaneously on these frequencies: 1887, 3555, 7215, and 14,100 kc., and 52 and 146 Mc (megacycles). Slow speed transmissions begin at 9:30 p.m. EST. Transmissions are at different speeds, beginning with five words per minute. After some practice, you may want to try for the ARRL's code proficiency awards, run once a month.

## DX SWLing

To the SWL, just one word of caution: The Communications Law prohibits revealing interstate or foreign communications to any person other than the addressee. Have your fun listening, but don't talk to others about what you hear—unless, of course, the broadcast is for the general public.

During World War II and the Korean fighting many SWLs in various parts of the world have monitored Prisoner of War messages from enemy countries and relayed them to home-folks. Many of these messages have been the first word families have had in months from men often listed as missing. Even today the New Zealand Radio DX League is active in picking up Radio Peking POW messages.

In this country there are some 90,000 licensed hams, and with the new Novice Class license now in effect, it will probably go over 100,000 any day. How many more thousands of SWLs there are tuning the bands is anyone's guess. There are many thousands of SWLs in Europe, and surprising enough, amateurs here receive tens of thousands of SWL cards from all over Europe, particularly from Russia. Behind the iron curtain, and in many other European nations, even SWLs must register and pay a fee for listening. In America there is no restriction on listening, and the license for broadcasting is free!

Many SWLs are happy just to listen, never longing for a "ticket." Like others, however, you may find that the world of radio really becomes magic when, after receiving a license, you hear a station in Arizona or Africa or Australia calling, and you throw your transmitter switch and go after him!

## "Q" Signals

"Q" signals used to express briefly and clearly expressions common in radio work. The "Q" abbreviation takes the form of a question if it is followed by a question mark.

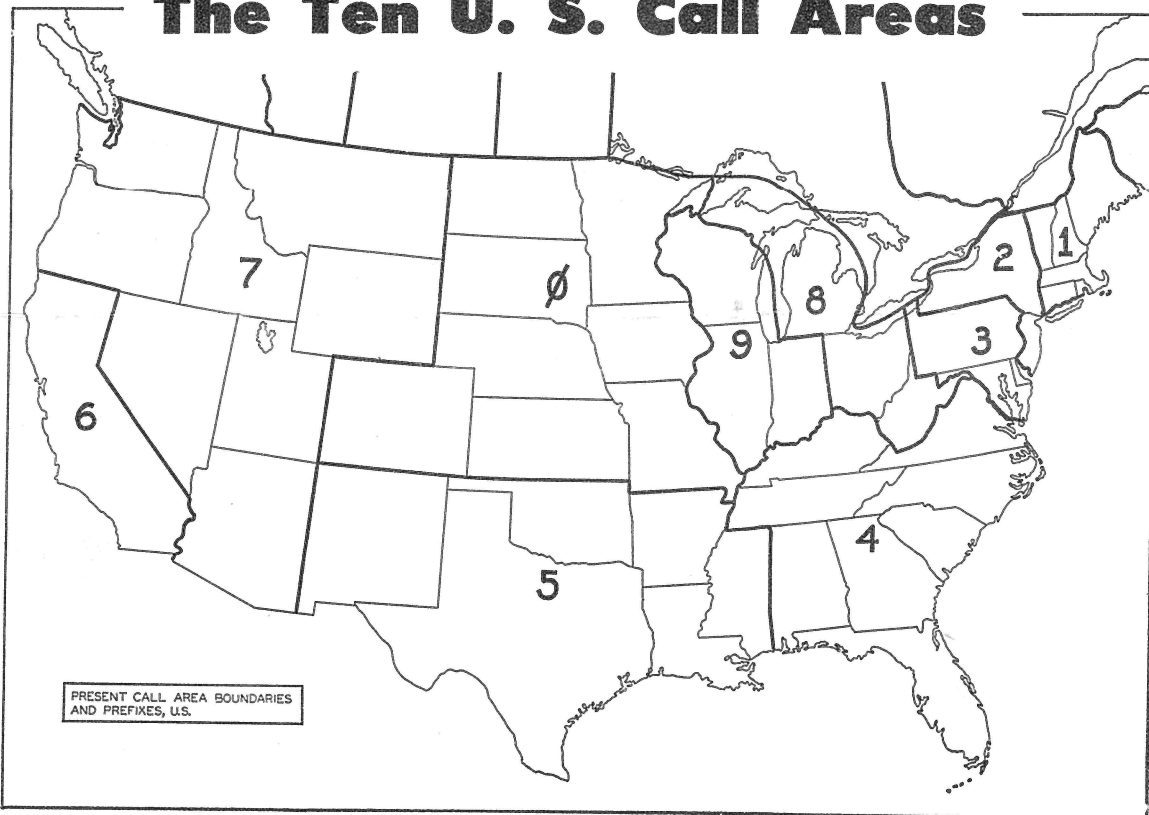
QAV	Are you calling me? I am calling . . . .
QRG	What is my exact frequency? Your exact frequency is . . . .
QRK	What is the readability of my signals (or those of . . .)?
QRL	Are you busy? I am busy with . . . .
QRM	Are you being interfered with? I am interfered with.
QRN	Are you troubled by atmospherics? I am being troubled by atmospherics.
QRO	Shall I increase power? Increase power.

QRP	Shall I decrease power? Decrease power.
QRQ	Shall I send faster? Send faster (. . . words a minute).
QRS	Shall I send more slowly? Send more slowly (. . . words a minute).
QRT	Shall I stop sending? Stop sending.
QRU	Have you anything for me? I have nothing for you.
QRV	Are you ready? I am ready.
QRX	When will you call again? I will call you again at (. . .)
QRZ	By whom am I being called? you are being called by (. . .)
QSB	Does the strength of my signals vary? The strength of your signals varies.
QSL	Can you give me acknowledgement of receipt? I give you acknowledgement of receipt.
QSO	Can you communicate with . . . . I can communicate with . . . .
QSP	Will you relay to . . . . I will relay to . . . .
QTH	What is your position (location)? My location is . . . .
QTR	What is the exact time? the time is . . . .
QRRR	Official "land SOS." A distress call for use by a station in an emergency situation.

Standard abbreviation used by radio amateurs

AA	all after
ABT	about
AGN	again
ANI	any
BCI	broadcast interference
BCNU	I'll be seeing you
BK	break
BTR	better
CRD	card
CUD	could
CUL	see you later
DX	distance
ES	and
FB	fine business, good
FM	from
FR	for
GA	go ahead
GB	good-by
GG	going
GM	good morning
GN	good night
GUD	good
HAM	radio amateur
HRD	heard
HV	have
HW	how
K	go ahead
NIL	nothing
NR	number
OM	old man (any male amateur)
OP	operator
PSE	please
SKED	schedule (an appointment to meet on the air)
SWL	short wave listener
TNX	thanks
U, UR	you, your
VY	very
WAG	worked all continents
WAS	worked all States
WL	well
WX	weather
XMTR	transmitter
XTAL	crystal
XYL	wife of an amateur
YL	young lady (any female amateur)
73	best regards

## The Ten U. S. Call Areas





# That Novice License

**T**HE NEW NOVICE Class license for radio amateurs is a whopping success. Over 1,000 new hams took to the short waves in July alone, the first month in which the licenses were issued. To qualify, the radio amateur needs to pass a code test in sending and receiving at least five words per minute, and pass a written examination. You can get a set of sample test questions free from the FCC Amateur Division, Washington 25, D. C. Another sample set, developed by the American Radio Relay League, appears in the League's *New License Manual*, available at 50¢ per copy from ARRL, West Hartford, Conn. The following are some of the questions and answers from the *New License Manual*:

(The references in parentheses at the end of answers to regulatory questions are to appropriate sections of the amateur rules or the Communications Act.)

**1. What is the maximum input power permitted to the final stage of the transmitter in a station licensed to the holder of a Novice Class license or operated by such an operator?**

The maximum input power permitted a Novice is 75 watts. (§ 12.23)

**2. What is the maximum penalty for a violation of the rules and regulations of the Federal Communications Commission?**

A fine of up to \$500 for each day during which the offense occurs, suspension of operator license, and revocation of station license. (Act, § 502)

**3. On what frequency bands may the holder of a Novice Class license operate an amateur radio station?**

3700-3750 kc.  
26.96-27.23 Mc.  
145-147 Mc.  
(§ 12.23)

**4. On what frequency bands may the holder of a Novice Class license operate an amateur radiotelephone station?**

145-147 Mc. (§ 12.23)

**5. What is the log of an amateur station, and what information is required to be entered therein? How long must it be preserved?**

The log of an amateur station is the written record of transmissions. The log must show:

- 1) the date and time of transmission
- 2) the signature of each licensed operator operating the equipment and the name

of any person not holding a license who speaks over a radiotelephone transmitter

- 3) call of the station called
- 4) the input power to the transmitter
- 5) the frequency band used
- 6) the type of emission used
- 7) the location of the station at the time of transmission
- 8) the message traffic handled

Information such as the input power, frequency band, type of emission, location of station, need be entered only once provided the conditions are not changed. Similarly, one entry of the date need not be repeated for other transmissions made on that date. If the station is mobile, the approximate geographic location can be indicated in the log.

The log of an amateur station must be preserved for at least one year following the last date of entry. Similarly, any message traffic handled must be kept on file for at least one year. (§ 12.136)

**6. What is the term of an amateur Novice Class license? Under what conditions may this license be renewed?**

The term of an amateur Novice Class license is one year. (§ 12.29)

It may not be renewed under any conditions. (§ 12.27(b))

**7. What are the rules and regulations regarding the transmission of improper language, false signals, or malicious interference?**

The transmission of obscene, indecent or profane language, or of false or deceptive signals or call letters, or of malicious interference is expressly prohibited and there are heavy penalties for violation. (§§ 12.157, 12.158, 12.160)

**8. What are the rules and regulations regarding purity and stability of emissions?**

Below 144 megacycles, spurious radiations must be reduced in accordance with good engineering practice, and must not cause interference to near-by receivers of good engineering design not tuned to the transmitter. Voice modulation of a transmitter must not cause spurious emissions; the maximum modulation percentage is 100. Simultaneous frequency modulation and amplitude modulation is not permitted. The frequency of the signal transmitted must be as constant as the state of the art permits. (§ 12.133)

**9. What method of frequency control is required to be used in the transmitter of a station licensed to the holder of a Novice Class license?**

The frequency must be crystal-controlled. (§ 12.23)

**10. What are the rules and regulations regarding the measurement of the frequencies of the emissions of an amateur radio station?**

Regular measurement of the frequency of the transmitter is required. This measurement must be by means independent of the means used to control the transmitting frequency and must be of sufficient accuracy to ensure operation within the frequency band used. (§12.135)

**11. Who may be permitted to operate the transmitter of an amateur radio station licensed to the holder of a Novice Class license?**

Any amateur radio operator except of the Technician Class. (§12.28)

**12. Under what circumstances may an amateur radio station be used by a person who does not hold a valid license?**

A person not properly licensed may not operate an amateur station. However, he may speak over the microphone of an amateur radiotelephone station provided a duly-licensed operator is present to control the emissions. (§ 12.28)

**13. What is the maximum permissible percentage of modulation of an amateur radiotelephone station?**

One hundred per cent. (§ 12.133)

**14. At what intervals must an amateur station be identified by the transmission of its call sign? May any transmission be made without identification of the station?**

An amateur station must identify its call sign at the beginning and end of each transmission and at least every ten minutes if a single transmission lasts longer than ten minutes. No transmission by itself may be made without identification of the station, except that during a sequence of transmissions each less than three minutes long, the call sign needs to be given only once each ten minutes as well as at the beginning and end of the work. (§ 12.82)

**15. Under what conditions is notice of portable or mobile operation required to be given, and to whom in each case?**

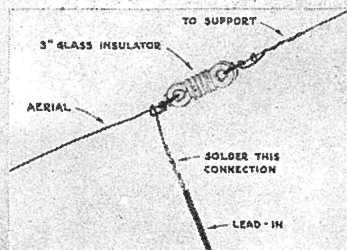
Notice of intended portable operation, or mobile operation, must be given the FCC Engineer-in-Charge of the inspection district in which such portable or mobile operation is contemplated only when the operation is or is expected to be for a period longer than 48 hours. (§ 12.91)

**16. What are the recognized abbreviations for: kilocycles, megacycles, Eastern Standard Time, Greenwich Mean Time, continuous wave, frequency modulation, amplitude modulations?**

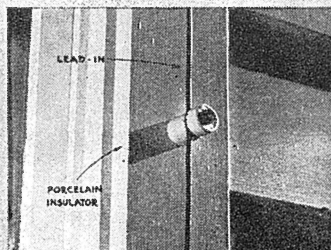
kilocycles — kc.  
megacycles — Mc.  
Eastern Standard Time — EST  
Greenwich Mean Time — GMT  
continuous wave — c.w.  
frequency modulation — f.m.  
amplitude modulation — a.m.



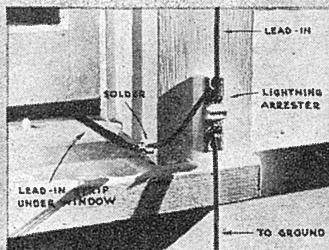
If you have a crystal set or a one or two tube radio, then you will want to install a good aerial. Here are a few suggestions to help you put up your own. For best reception, avoid running it parallel to power lines. This minimizes noise. Safety first, too! Be careful where and how you climb. And don't throw antenna wire over power lines—it's dangerous.



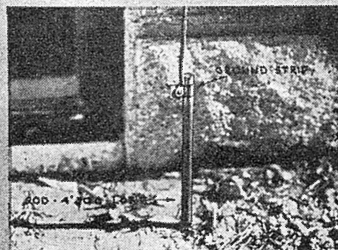
This is a good way to fasten the insulators at each end of the aerial. Only the lead-in end is shown in the photo.



The lead-in wire should be supported at convenient distances, about 6 to 8 feet, by porcelain knob insulators.



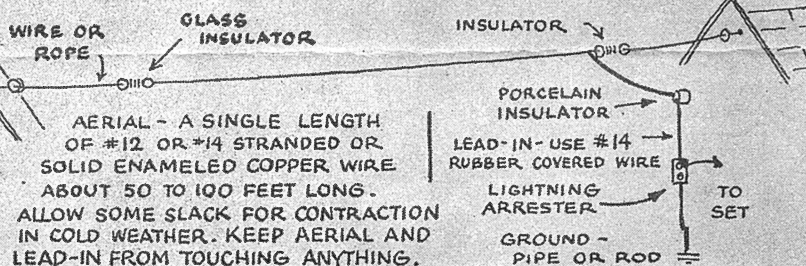
Here is a typical installation outside a window. The lead-in strip under the window saves boring an insulator hole.



Securely fasten ground wire to deeply driven pipe or rod 4 to 6 feet long. A water or radiator pipe will do too.

## Putting Up an Aerial

By Fred Roden and Glenn Wagner



If you have, you've probably been listening to short wave bands and you're rarin' to talk back. SWLing is lots of fun, but it just isn't natural to sit and listen all the time without getting the urge to throw in your two cents' worth.

acquired a receiver, by now you will be well on your way toward the Novice Class license. You'll need that ticket to operate your transmitter, but not to build it, so here goes.

There are dozens of different designs for transmitters, and what sort of rig you build depends on your ability and your pocketbook. Most fellows start off with something fairly simple and inexpensive. This gives them a chance to sort of feel their way along and not get in over their heads at the outset.

At the left, below, is a photograph of a complete transmitting layout except for the antenna. In a future issue **BOYS' LIFE** will give you some help on constructing the power supply and the antenna. The transmitter is at the left of the layout, with the power supply at the right. In front is the telegraph key. At the left rear you can see the end of the antenna wire running toward the top of the photograph.

From the two pictures at the lower left you'll see how the various parts are mounted. The placement of the parts is not critical—just follow the layout with reasonable care. The tuning condenser C<sub>3</sub> is mounted right in the middle of the front edge of the chassis. Three holes have to be drilled—two about 1/8" in diameter for the condenser mounting screws and one about 1/2" in diameter to clear the shaft of the condenser. This shaft must not touch the chassis, and with a 1/2" hole there will be plenty of clearance. The centers of the sockets for the tube and the crystal are 2 inches in from the right-hand edge, with the tube socket being 2 1/2 inches back from the front edge and the crystal socket being 5 inches back from the front edge. You'll need a 1 1/8" socket punch for these socket holes—you can buy the punch or borrow it from a ham friend.

The feed-through insulators on which coil L<sub>1</sub> is mounted are paced  $2\frac{1}{2}$ " in from the left-hand edge and are  $1\frac{3}{4}$ " and  $4\frac{3}{4}$ " back from the front edge. These insulators fit snugly in a  $\frac{1}{4}$ " hole and are held in place with the nuts which are supplied with them. Soldered connections may be made to the length of heavy wire which extends through the center of the insulator. Antenna coil L<sub>2</sub> is held in place by its connections to the antenna condenser C<sub>4</sub>, which in turn is mounted at the left rear of the chassis as shown in the photographs. The connections between C<sub>4</sub> and L<sub>2</sub> should be long enough so that the position of the coil may be varied for proper adjustment. The easiest way to

make these connections is to make coil L2 with a couple of extra turns and then peel off enough of the wire (one turn peeled at each end will be enough) to make the leads to the condenser C4.

The key leads and power supply leads come out of a hole in the back of the chassis. This 1/2" hole is protected by a 1/2" rubber grommet so that the leads won't be chafed. It's a good idea to identify these leads by means of Scotch Tape and small tags of paper.

more commonly known as a schematic diagram. By now, having built a receiver, you are probably quite familiar with what the various symbols mean, and so will have no difficulty. You will note on the diagram that each of the various leads to the tube elements has a number. These numbers correspond to those which will be found stamped on the bottom of the tube socket. This greatly facilitates wiring. Another octal tube socket is used for the crystal. A regular crystal socket could have been used, but the octal socket is cheaper.

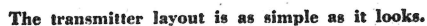
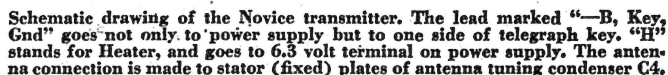
As you can see from the photographs, there are actually very few connections to be made, and it will not take you long to complete the wiring.

If metal chassis is unavailable, use wood. Follow the same wiring diagram. Connect with wire all the points indicated as ground connections.

*You must have an amateur license before you can use this transmitter on the air.*

The American Radio Relay League in West Hartford, Connecticut, publishes a License Manual which they'll send you postpaid for 50 cents. It's a guide on how to get a license, and you'll find it valuable.

C1, C2, C5—0.01 mfd, 400 volt paper  
 C3—100 mmfd variable (Millen 22100)  
 C4—200 mmfd variable (Millen 19200)  
 R1—100,000 ohm, 1/2 watt  
 R2—25,000 ohm, 10 watt  
 L1—B & W Miniductor §3016 (use as is)  
 L2—B & W Miniductor §3015 (approximately 30 turns)  
 Crystal between 8705 and 3745 kc.  
 Tube—6AG7  
 2 bakelite octal sockets  
 2 tuning knobs  
 2 feed-through insulators (National TPB)  
 1 metal chassis 7 x 7 x 2 inches  
 1/8" rubber grommet







# Ham Power Supply and Antenna

**YOU'LL NEED** A transmitter power supply and antenna to complete your BOYS' LIFE amateur radio station. After you outgrow your first rig, you'll keep the power supply around your radio shack for many different uses.

## Power Supply

The photograph and schematic drawing below give details of the power supply, but the parts don't have to be placed exactly as shown.

To cut square hole for the power transformer, you either drill  $\frac{1}{8}$ " holes around the edge of the outline, then finish with small cold chisel and file, or you can drill a  $\frac{1}{2}$ " hole at each corner, then cut with a keyhole hacksaw. You'll need a tube socket punch to cut the hole for the tube socket.

Terminal strips can be left out, but they do make your wiring job neater. Also, they solve the problem of how to mount filter condensers C1 and C2. Condensers are held rigid when you solder their wires to the terminal strips. The leads from the transformer are coded with different colors, explained on a chart which comes with each transformer. The center tap of the 6.3 volt winding (usually coded green-yellow) is not used. Tape the end so it does not touch other wires.

## Power Supply Parts

Parts you'll need for your power supply are: T1—Power transformer, 325 V.A.C., 70 ma. (Merit type P-2951). L1—Filter Choke, 3 henries, 70 ma. (Stancor C1707). C1, C2—8 mfd 450 volt electrolytic condensers. R1—25,000 ohms, 10 watts. 5Y3GT tube. 1 octal tube socket. 4 two-terminal terminal strips. 1 terminal strip (Millen 37303). 1 SPST switch. 1 half-inch rubber grommet. Nuts

and bolts, 6-32, and some hook-up wire.

## Antenna

Most hams spend a lot of time experimenting with various antenna combinations. For a starter, stretch 100 feet of wire as high as you can get it. Keep the wire away from branches and other obstructions. Use insulators where antenna is suspended from poles, trees, or buildings.

## Tuning Up

*Don't connect your transmitter to the antenna before you get your amateur ticket.* Then, make sure your antenna is picking up the transmitter power. One simple check

is to hold a  $\frac{1}{4}$ -watt or  $\frac{1}{2}$ -watt neon bulb against the antenna wire where it connects to the transmitter. You can also test before installing the antenna, by connecting an ordinary 25-watt bulb in series between the antenna connection and ground. Tune C4 for the brightest glow.

## More Help

For more help on setting up your amateur radio station write to American Radio Relay League, West Hartford, Connecticut, for a free copy of "Operating an Amateur Radio Station." The League will also help you with your problems. Just write and ask.

## Learn the Code

**J**UST FORGET Morse Code ever had anything to do with dots and dashes. Think of it as two sounds—"dit" and "dah"—and spaces, and you'll find code easy.

You can learn code alone, but with a class or gang it will be easier. Two 15 minute sessions are better than one full hour.

Memorize four letters at a time. Juggle them so you recognize them no matter what order you receive them in. Make words from them and get to recognize the words before tackling the next four letters.

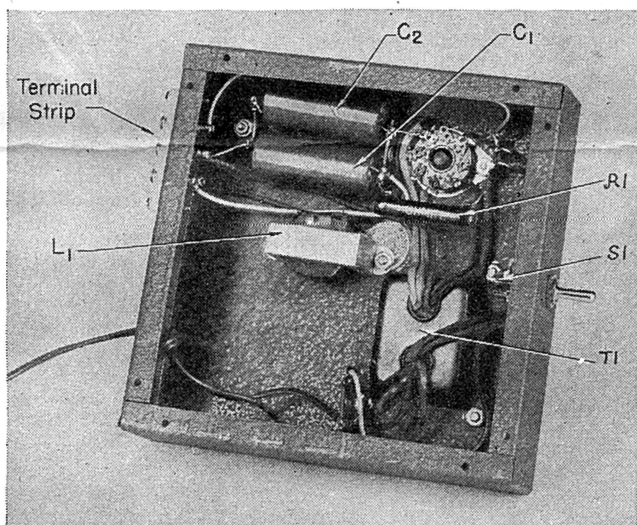
When you see letters you know on billboards or anywhere, repeat them in code to yourself. It helps. When you think you're ready to practice with a telegraph key, try the "snorker" described on the next page.

Clip the code, at right, and carry it with you. No telling where you'll get a chance to brush up—waiting for someone, riding a bus, baby sitting, to name a few possibilities.

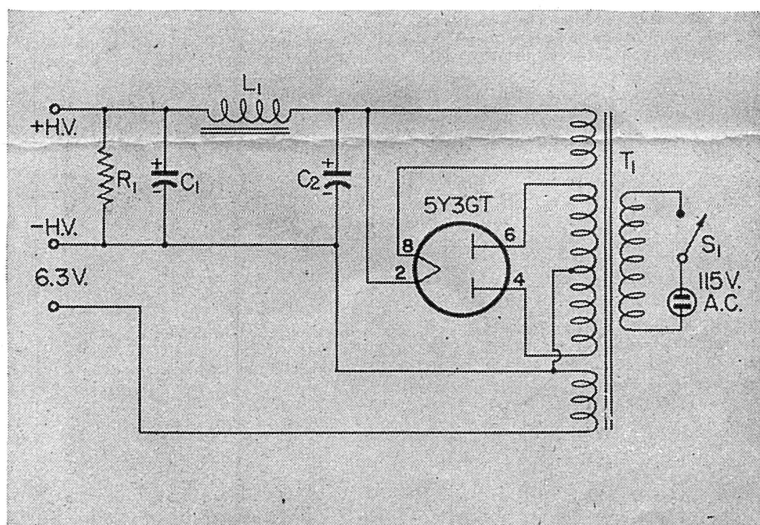
## Code Chart

A. DiDah	R. DiDahDit
E. Dit	S. DiDiDit
I. DiDit	T. Dah
O. DahDahDah	V. DiDiDiDah
U. DiDiDah	W. DiDahDah
B. DahDiDiDit	X. DahDiDiDah
C. DahDiDahDit	Y. DahDiDahDah
D. DahDiDit	Z. DahDahDiDit
F. DiDiDahDit	1. DiDahDahDahDah
G. DahDahDit	2. DiDiDahDahDah
H. DiDiDiDit	3. DiDiDiDahDah
J. DiDahDahDah	4. DiDiDiDiDah
K. DahDiDah	5. DiDiDiDiDit
L. DiDahDiDit	6. DahDiDiDiDit
M. DahDah	7. DahDahDiDiDit
N. DahDit	8. DahDahDahDiDit
P. DiDahDahDit	9. DahDahDahDahDit
Q. DahDahDiDah	0. DahDahDahDahDah

Period. DiDahDiDahDiDah  
Comma. DahDahDiDiDahDah  
Question Mark. DiDiDahDahDiDit



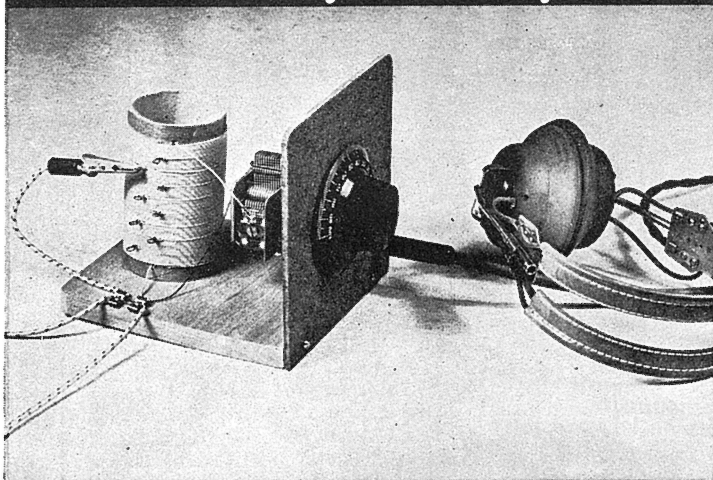
Bottom view. Large terminal strip outside chassis. Smaller strips support condensers, and run right of tube socket, left of transformer.



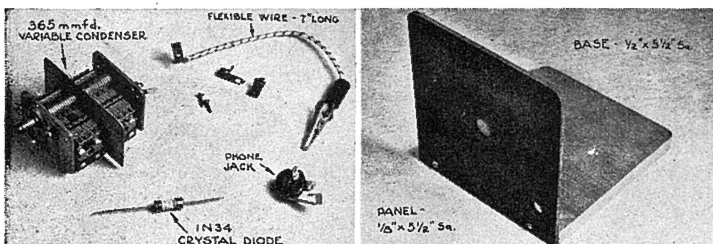
Schematic diagram. Numbers on tube in diagram are same as numbers stamped on tube socket. For best results, follow above layout as closely as possible.

# A Modern CRYSTAL RADIO SET

by Glenn A. Wagner

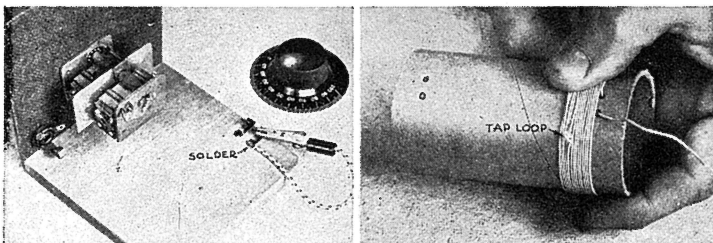


You can build this modern crystal radio set in about an hour. It uses a fixed crystal diode instead of the old cat's whisker. You'll need a 2000 ohm head set. Use a 30 to 50 foot antenna and a good ground to a cold water pipe. If stations overlap, tap the antenna down on the coil. It costs nothing to operate.



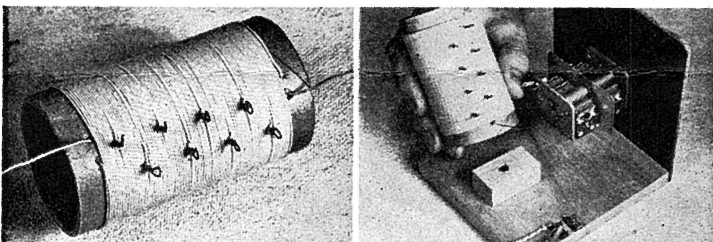
Here are the parts you need, except the coil. Any tuning condenser taken from an old set may be used. Buy the crystal diode.

Make a suitable chassis. This one is made of Masonite and wood. Holes in the panel are for the condenser and phone jack.



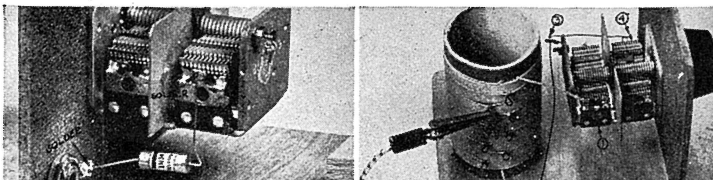
Mount condenser and phone jack on panel, and the antenna and ground clips on the base. Solder coil wire to antenna clip.

Wind 90 turns of #22 single cotton covered magnet wire on 2"D.x4" mailing tube. Tap coil every 10 turns; twist wire loop.



Here's the finished coil. Note that coil taps are staggered to avoid shorting with the clip. Clean insulation off the loops.

Cut a block of wood to just fit inside the tube and fasten block to the base with a wood screw. Slip the coil over the block.



## The Boys' Life Radio Club and Radio Contest

HERE'S YOUR CHANCE to become a charter member of the BOYS' LIFE RADIO CLUB—and win a brand new transmitter, receiver, code practice set or one of the many other prizes.

To join this club all you need is an interest in radio. To express your interest, fill out and send in the membership application form below and you will receive a membership certificate and a free kit of materials to help you enter the BOYS' LIFE RADIO LISTENING CONTEST, which is co-sponsored by the RADIO-TELEVISION MANUFACTURERS ASSOCIATION and BOYS' LIFE with the cooperation of the AMERICAN RADIO RELAY LEAGUE.

### Look at the contest kit you receive absolutely FREE:

1. Membership certificate in the BOYS' LIFE RADIO CLUB
2. A book of BOYS' LIFE radio reprints
3. Official contest log sheets
4. A booklet on amateur radio from the AMERICAN RADIO RELAY LEAGUE
5. An ARRL information sheet
6. A card addressed to ARRL that will enable you to secure help in the contest
7. List of ARRL amateur radio publications

If you do not wish to cut your magazine, put the information on a postal card. We'll rush *your* kit right along to you.

Once you receive this kit, you're ready to begin working for one of the big prizes. All you need is a receiver which you may buy or build. Plans for a one-tube receiver are in the BOYS' LIFE Radio Reprint Book. The ARRL card will get you help if you need some.

At your listening post you begin logging (writing down the call letters of the stations you hear). On page 20 of this issue of BOYS' LIFE you will find an article on Short Wave Listening. You receive point awards as follows:

- a. Each station logged (on official log sheets or copies). 1 pt.
- b. Each of the 48 United States logged.....10 pts.
- c. Each U. S. Call Area logged..... 5 pts.
- d. Each foreign country logged..... 5 pts.

A total of 50 to 100 prizes, supplied by the leading radio companies and made available through the RADIO-TELEVISION MANUFACTURERS ASSOCIATION and the AMERICAN RADIO RELAY LEAGUE, will be awarded to those with the highest scores in each of the two divisions:

**CLASS A—Manufactured receivers, including converted surplus.**

**CLASS B—Home-built receivers, including those built from kits.**

We'll have a complete list of prizes in next month's BOYS' LIFE. In case of ties, duplicate prizes will be awarded.

What's more, you also have a chance to earn these BOYS' LIFE Radio Club certificates of attainment:

1. The LACA (Logged All Call Areas) certificate to all entrants logging the 10 U. S. Call Areas.
2. The LAS (Logged All States) certificate to all entrants logging the 48 states.
3. The LAC (Logged All Continents) certificate to all entrants logging the six continental areas, North America, South America, Europe, Asia, Africa, and Australia-Oceania.

The contest is open to anyone who will not have reached his nineteenth birthday by January 1, 1953. Contest opens January 1, 1953, and closes February 28, 1953. All entries must be postmarked before March 15, 1953. Winners will be announced in the May issue of BOYS' LIFE. The contest is not open to licensed radio amateurs. However, hams may join the BOYS' LIFE Radio Club and receive certificates for Logging (LAS, LAC, etc.)

Send entries to BOYS' LIFE Radio Contest, 2 Park Avenue, New York 16, N. Y., and be sure to send today for your FREE kit.





## HOW TO USE THE OFFICIAL RADIO CONTEST LOG SHEETS

1. Number the pages (1, 2, 3, etc.)
2. **DATE:** Fill in the date on each new day you log any station. Once for each day is sufficient.
3. **TIME:** Use local Standard Time.
4. **STATION HEARD:** Give call letters or other identification heard, example: WIAW, KZLO, 'Radio Algiers'.
5. **PHONE-CW:** If you hear voice or music, put 'Ph'; if code, put 'CW'.
6. **LOCATION (QTH):** Give city and state for stations heard which are in the United States. For foreign stations, give country.
7. **PROGRAM OR QSO WITH:** Briefly describe the program: 'news in English', 'Spanish music', 'lady singing in French', 'orchestra music', etc. If you are listening to an amateur, you have already listed his call letters in the 'STATION HEARD' column. In this column put the call letters of the station he is talking to. Amateurs must identify themselves and give their location at least once every ten minutes. Thus, the amateur 'phone bands are a pretty good place to log many stations quickly. If you know the code, the amateur code bands are even better.
8. **FREQUENCY:** List the frequency as near as possible in kilocycles (kc), example: 1742 kc. Or megacycles (mc), example: 14.010 mc. Or give the band, example: 20 meters.

If you need more log sheets, send a stamped, addressed envelope to BOYS' LIFE, 2 Park Ave., New York 16, N. Y., for more or make your own copies.

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### BOYS' LIFE RADIO CONTEST ENTRY FORM

To RADIO CONTEST ... BOYS' LIFE, 2 Park Avenue, New York 16, N. Y.

Attached are my log sheets as an entry in the Radio Contest.

My receiver was: manufactured\_\_\_\_\_, home built\_\_\_\_\_. (check one)

My total score for all log sheets is:\_\_\_\_\_

No. of different stations heard (1 point each)\_\_\_\_\_

No. of states heard (10 points each)\_\_\_\_\_

No. of U. S. call areas heard (5 points each)\_\_\_\_\_

No. of foreign countries heard (5 points each)\_\_\_\_\_

Total\_\_\_\_\_

Name\_\_\_\_\_ Scout Unit (if member BSA)\_\_\_\_\_

Street Address\_\_\_\_\_ City\_\_\_\_\_ State\_\_\_\_\_

**Adult Attest** To the best of my knowledge the listening and logging as shown on this contest entry was done by the contestant, without assistance.

Name\_\_\_\_\_ Street Address\_\_\_\_\_

City\_\_\_\_\_ State\_\_\_\_\_

[illegible]**TOTALS THIS SHEET ...****No. Stations** \_\_\_\_\_**No. Foreign Countries** \_\_\_\_**No. States** \_\_\_\_\_**No. Call Areas** \_\_\_\_\_